



PCT/GB 2003 / 0 0 4 9 8 6



INVESTOR IN PEOPLE

The Patent Office
Concept House
Cardiff Road
Newport

South Wales
NP10 8QQ
REC'D 18 DEC 2003

WIPO PCT

PRIORITY DOCUMENT
SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH
RULE 17.1(a) OR (b)

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

Signed

H. Behan

Dated

11 December 2003

BEST AVAILABLE COPY

Patents Form 1/77

Patents Act 1977
(Rule 13)

THE PATENT OFFICE
19 NOV 2002
RECEIVED BY FAX

The
Patent
Office

19/11/02 F764447-1 D03012
POL/7700 0.00-0226896.9

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form.)

The Patent Office

Cardiff Road
Newport
South Wales
NP9 1RH

1. Your reference

P3125

2. Patent application number

(The Patent Office will fill in this part)

0226896.9

19 NOV 2002

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Huntleigh Technology PLC
310-312 Dallow Road
Luton
Bedfordshire
LU1 1TD

Patents ADP number (*if you know it*)

506907001

If the applicant is a corporate body, give the country/state of its incorporation

United Kingdom

4. Title of the invention

Electrical Coupling

5. Name of your agent (*if you have one*)

"Address for service" in the United Kingdom
to which all correspondence should be sent
(*including the postcode*)

Shalini Thaker
Group IPR Department
Huntleigh Technology PLC
310-312 Dallow Road
Luton
Bedfordshire
LU1 1TD

Patents ADP number (*if you know it*)

7111263003

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (*if you know it*) the or each application number

Country

Priority application number
(*if you know it*)Date of filing
(*day / month / year*)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(*day / month / year*)8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (*Answer 'Yes' if:*

Yes

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or

c) any named applicant is a corporate body.

See note (d))

Patents Form 1/77

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form -

Description 4

Claim(s) 2

Abstract *Done*Drawing(s) 1 *only*

10. If you are also filing any of the following, state how many against each item.

Priority documents -

Translations of priority documents -

Statement of inventorship and right to grant of a patent (Patents Form 7/77) -

Request for preliminary examination and search (Patents Form 9/77) -

Request for substantive examination (Patents Form 10/77) -

Any other documents -
(please specify)

11.

I/We request the grant of a patent on the basis of this application.

Signature

Date 19 November 2002

12. Name and daytime telephone number of person to contact in the United Kingdom

Tracey Long (01582) 745812

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

- If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.
- Write your answers in capital letters using black ink or you may type them.
- If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.
- If you have answered "Yes" Patents Form 7/77 will need to be filed.
- Once you have filled in the form you must remember to sign and date it.
- For details of the fee and ways to pay please contact the Patent Office.

Patents Form 1/77

Electrical Coupling

DUPLICATE

The present invention relates to a coupling arrangement for transferring electrical energy, in particular an inductive coupling arrangement for connecting a transducer to a measuring device. The invention replaces a conventional electrical connector with an inductive coupler where the electrical signal is alternating.

Conventional electrical connectors rely on conductors being brought into contact with one another and the quality of the contacts can reduce because of wear and corrosion of the contact surfaces resulting in noise affecting the transmission signals. Additionally they can result in electrical connections being exposed to the user and, in the case of medical equipment, the patient which could result in harmful circulating currents.

The present invention relates to a coupling mechanism for transferring electrical alternating signals between a transducer and a measuring circuit without the need for conductive contacts. In medical devices this has many advantages in that a low cost connector can be devised that can withstand the rigours of sterilisation, will not electrically wear and will have negligible leakage currents.

The transducer is normally connected to the electronics by cable connectors, and prior art transducers are usually connected to the electronics by means of a cable having electrical connections. However, electrical connectors for use with such transducers have to withstand numerous sterilisation cycles with approved sterilants and high level disinfectants. These connectors must also be immune to enzyme or detergent solutions and in many cases must be supplied with a protective cover or boot to prevent the ingress of sterilising or

disinfectant solutions. Because of the sterilisation process, it is difficult to prevent corrosion or oxidation of the contact surfaces of the connectors even when covered.

5 In addition they must be capable of withstanding high temperatures and high pressures simultaneously, when autoclaved.

The object of the present invention is to provide a simple sealed signal connection between the cable
10 connected with the transducer and the electronics without the disadvantages of having exposed contact surfaces.

Accordingly, the present invention provides a magnetic coupling for transferring electrical energy to or from a transducer and measuring circuit, said coupling
15 comprising a first coil of an inductive coupling arrangement connected to said transducer and a second coil of the inductive coupling arrangement connected to the measuring circuit. Preferably, the first and second coils are enclosed in separate housings, the first
20 housing detachably attached within the second housing. Therefore, the electrical energy is transferred without electrical connectors having exposed contact surfaces.

In a preferred embodiment, the magnetic coupling is at the end of a cable connector with at least one
25 transducer, the connector including a first housing enclosing the end of the cable, a first coil of an induction coupling arrangement electrically connected to the end of the cable within the housing, the housing detachably connected to a second coil of the inductive
30 coupling arrangement to make the signal coupling.

Preferably, the first housing is hermetically sealed to allow for sterilisation. Preferably, the second inductive coil is enclosed in a second housing dimensioned to allow free travel of the first housing to
35 make the signal coupling.

More preferably, the first and second housings are held together by suitable frictional or latching means.

An embodiment of the present invention is described below, by way of example only, with reference to the
5 accompanying drawings in which:

Figure 1 shows a partial sectional view of the male part of the connector;

Figure 2 shows a partial sectional view of the female part of the connector; and

10 Figure 3 shows the two parts in Figures 1 and 2 joined together.

In inductive connectors, there is no direct transfer of energy from one connector to the other, i.e. by means of an electrical connection. Energy is transferred
15 magnetically between connectors in the same manner as in a transformer.

The inductive coupling consists of a male connector part including a coil wound on a magnetic core and a female connector part containing a second coil wound so
20 as to enclose the male connector part.

With reference to Figure 1, a single layer solenoid 7 is wound on a ferromagnetic rod 6 which may be composed of Manganese-Zinc or Nickel-Zinc ferrite material chosen for the desired operating frequency range. The ends of
25 the solenoid winding 5a and 5b are connected to conductors 3a and 3b via solder connections 4a and 4b. Conductors 3a and 3b are connected to an ultrasound probe (not shown) via cable 1. Cable 1 may be of coaxial or twisted pair construction. Solenoid 7, ferromagnetic core
30 6 and cable terminations 4a, 4b are surrounded by plastic housing 2. A hermetic seal is provided by filling internal void 8 with a synthetic resin (not shown). In addition the synthetic resin provides strain relief for cable 1.

35 With reference to Figure 2, a plastic housing 10 contains a single layer solenoid 11. Solenoid 11 is

dimensioned so as to allow the free travel of the male connector part when the connectors are mated. The ends of solenoid 11 are brought out to terminals 12a and 12b to facilitate electrical connection to the ultrasound drive electronics (not shown). The solenoid 11 may be glued or bonded into the housing 10 by means of synthetic resin or similar or the housing 10 may be injection moulded around the coil 11.

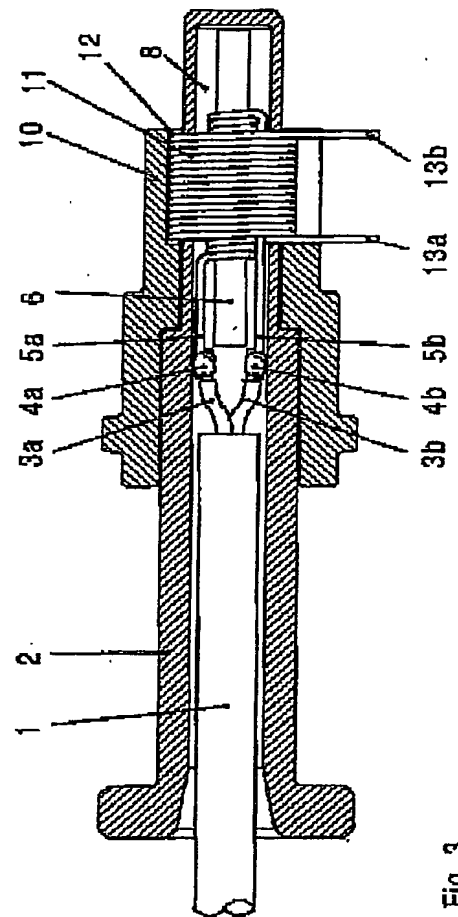
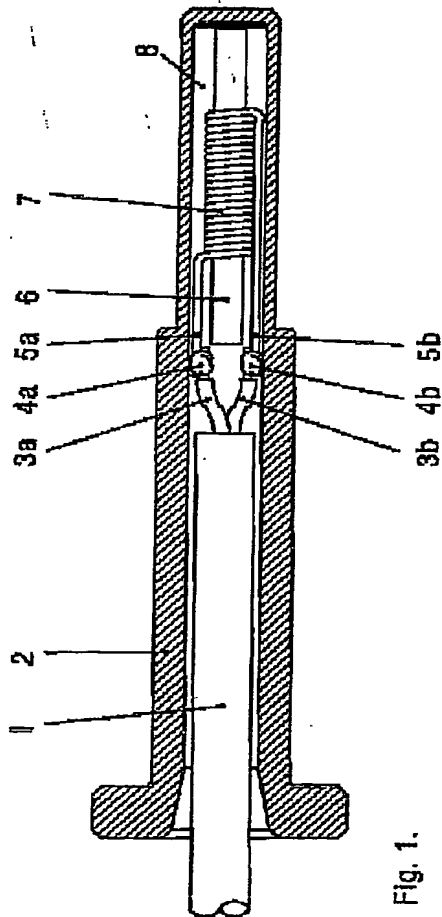
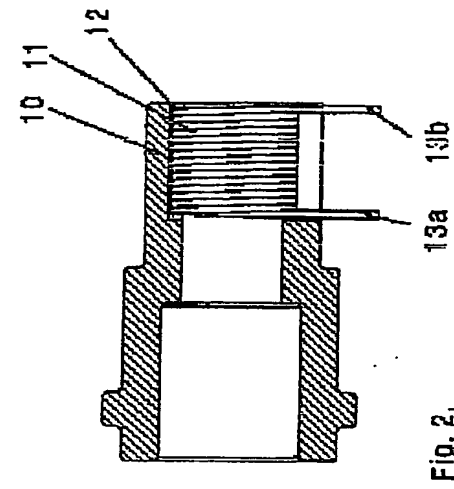
Figure 3 shows the two connector parts when they are joined together. The connectors may be held together by means of friction or a suitable latching mechanism (not shown).

Although the invention has been described with a specific configuration of the male and female parts, it will be understood that the size of the two parts and their respective coils may be adjusted to optimise the transformer magnetising and leakage inductance for different operating frequencies or different source or load impedances. Furthermore, although the specific example above relates to an ultrasound probe, the invention is equally applicable to similar electrical connections for transducers and their electronics where exposed electrical connections are undesirable. Similarly, although the example relates to a single transducer and its connection, the invention covers multiple transducers and their mutual or individual electrical connections to their electronics.

CLAIMS:

1. A magnetic coupling for transferring electrical energy to or from a transducer and measuring circuit,
5 said coupling comprising a first coil of an inductive coupling arrangement connected to said transducer and a second coil of the inductive coupling arrangement connected to the measuring circuit.
- 10 2. A magnetic coupling as claimed in claim 1 wherein the first and second coils are enclosed in separate housings, the first housing detachably attached within the second housing.
- 15 3. A magnetic coupling as claimed in claims 1 or 2 wherein the coupling is at the end of a cable connector connected to at least one transducer, the connector including a first housing enclosing the end of the cable,
a first coil of an induction coupling arrangement
20 electrically connected to the end of the cable within the housing, the housing detachably connected to a second coil of the inductive coupling arrangement to make the signal coupling.
- 25 4. A magnetic coupling as claimed in claims 2 or 3 wherein the first housing is hermetically sealed.
5. A magnetic coupling as claimed in claims 2, 3 or 4 wherein, the second inductive coil is enclosed in a
30 second housing dimensioned to allow free travel of the first housing to make the signal coupling.
6. A magnetic coupling as claimed in claim 5 wherein first and second housings are held together by suitable
35 frictional or latching means.

7. A magnetic coupling substantially as hereinbefore described and with reference to the accompanying drawings.



**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☒ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.